

REMARKS

Claims 1-5, 8-11, 14-17, 20-23, 26-29, 32-35, and 37-39 are presented for examination, claims 6, 7, 12, 13, 18, 19, 24, 25, 30, 31, and 36 having been withdrawn from consideration. Claims 1, 8, 14, 20, 26, and 32 are independent.

Applicants amend claims 1, 8, 14, 20, 26, and 32 herein to better claim the invention. No new matter is added. Support for the amendments may be found throughout the Specification and Figures as originally filed, and specifically in the Specification at page 40, line 13 through page 41, line 2. Applicants respectfully submit that the pending claims are in condition for allowance.

Claim Rejections under 35 U.S.C. §103(a)

In the Office Action:

claims 1-5, 8-11, 14-17, 20-23, 26-29, and 32-35 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sauro et al., Omics: A Journal of Integrative Biology, Vol. 7, No. 4, 2003 (hereafter “Sauro”) in view of Kurata et al., Nucleic Acids Research, Vol. 31, No. 14, p.4071-4084, 2003 (hereafter “Kurata”) and further in view of Funhashi et al., Biosilico, Vol. 1 No. 3, pp. 159-162, November 2003 (hereafter “Funhashi”) (See the Office Action, page 4); and

claims 37-39 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sauro in view of Kurata and Funhashi, and further in view of Shannon et al., Genome research, Vol. 13, p. 2498-2504, 2003 (hereafter “Shannon”) and in view of *Presentation of Biospice*, DARPA BioComp, May 2002 (hereafter “Biospice”) (See the Office Action, page 5).

Applicants respectfully traverse the rejections.

Claims 1-5

Applicants’ claim 1 recites:

1. A system for improved modeling of a biological system that comprises a plurality of chemical reactions, the system comprising:

a modeling component comprising a graphical user interface for accepting user commands and input to construct or modify a model of the biological system;
a simulation engine accepting as input the constructed model of the biological system and generating as output dynamic behavior of the biological system; and
an analysis environment in communication with the simulation engine, *the analysis environment*
interfacing with data acquisition hardware that gathers data from an experiment, and
using data gathered from the experiment to either correct the model of the biological system or generate the model of the biological system.

In order to better claim the invention, Applicants amend claim 1 to recite that *the analysis environment interfacing with data acquisition hardware and using data gathered from an experiment to either correct the model of the biological system or generate the model of the biological system*. Applicants respectfully urge that Sauro, Kurata, and Funhashi, alone or in any reasonable combination, do not disclose or suggest at least this feature of claim 1.

Sauro describes a framework for integrating the Systems Biology Workbench and (with?) BioSpice (Sauro at Abstract). The Examiner points to Sauro at Figure 11 for an analysis environment. At Figure 11, Sauro displays a screenshot of “JDesigner and Jarnac working together to carry out and display results of a simulation” (Sauro at page 366, caption of Figure 11, emphasis added). The underlying Jarnac software is a “script based simulation tool” (Sauro at page 364) that loads pregenerated SBML models. JDesigner is a “model design tool for editing biochemical networks visually” (Sauro at page 364). Nothing in the description of Jarnac or JDesigner mentions interfacing with *data acquisition hardware* and using data gathered from an experiment to *either correct the model of the biological system or generate the model of the biological system*.

Kurata describes using CADLIVE to construct a large-scale biochemical network based on a simulation-directed notation (Kurata at title and abstract, emphasis added). Like Sauro, Kurata addresses only a generation and simulation of a biochemical network, and does not discuss interfacing with *data acquisition hardware* and using data gathered from an experiment to *either correct the model of the biological system or generate the model of the biological system*.

Funhashi describes the CellDesigner software (Funhashi at page 159). CellDesigner may integrate with simulation models (Funhashi at page 160, first column), but CellDesigner is silent with respect to (1) interfacing with ***data acquisition hardware*** and (2) using data gathered from an experiment to ***either correct the model of the biological system or generate the model of the biological system***. Indeed, CellDesigner describes the process of building a model at page 161, first and second columns; however, this passage does not mention ***data acquisition hardware*** or ***data gathered from an experiment***.

For at least the reasons set forth above, Applicants urge that Sauro, Kurata, and Funhashi alone or in any reasonable combination, do not disclose or suggest at least an ***analysis environment*** that ***interfaces with data acquisition hardware and uses data gathered from an experiment to either correct the model of the biological system or generate the model of the biological system***, which is present in claim 1. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 1 be withdrawn.

Claims 2-5 depend from independent claim 1 and, as such, incorporate all of the features of claim 1. Claims 2-5 are therefore allowable for at least the same reasons as claim 1. Applicants respectfully urge that dependent claims 2-5 recite additional patentable subject matter and respectfully request that the Examiner pass claims 2-5 to allowance.

Therefore, for at least the reasons set forth above, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claims 2-5 be withdrawn.

Claims 8-11

Applicants' claim 8 recites:

8. A computer-implemented improved method for modeling a biological process comprising a plurality of chemical reactions, the method comprising:
 - providing a graphical user interface;
 - receiving, via the provided user interface, user commands and data;
 - constructing, using the received user commands and data, a model of the biological process;
 - generating, using the constructed model of the biological process, dynamic behavior of the modeled biological process; and

providing an indication that data gathered from an experiment and the generated dynamic behavior differ by an amount greater than a predetermined amount, if the amount the data gathered from the experiment differs from the generated dynamic behavior is greater than the predetermined amount.

Applicants respectfully urge that Sauro, Kurata, and Funhashi, alone or in any reasonable combination, do not disclose or suggest at least: *providing an indication that data gathered from an experiment and the generated dynamic behavior differ by an amount greater than a predetermined amount, if the amount the data gathered from the experiment differs from the generated dynamic behavior is greater than the predetermined amount*, which is present in claim 8.

As noted above none of Sauro, Kurata, and Funhashi receive data gathered from an experiment. However, none of the references provide an indication when data gathered from an experiment differs from the generated dynamic behavior of the modeled biological process.

For at least the reasons set forth above, Applicants respectfully urge that Sauro, Kurata, and Funhashi, alone or in any reasonable combination, do not disclose or suggest each and every feature of Applicants' claim 8. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 8 be withdrawn.

Claims 9-11 depend from independent claim 8 and, as such, incorporate all of the features of claim 8. Therefore, for at least the reasons set forth above with respect to claim 8, Applicants respectfully urge that the above 35 U.S.C. §103(a) rejection of claims 9-11 be withdrawn.

Claims 14-17

Applicants' claim 14 is an "article of manufacture" claim corresponding to claim 8. Claim 14 includes: *computer-readable instructions for providing an indication that data gathered from an experiment and the generated dynamic behavior differ by an amount greater than a predetermined amount, if the amount the data gathered from the experiment differs from the generated dynamic behavior is greater than the predetermined amount.*

Applicants respectfully urge that Sauro, Kurata, and Funhashi, alone or in any reasonable combination, do not disclose or suggest each and every feature of Applicants' claim 14 for at least the same reasons as described above in relation to claim 8. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 14 be withdrawn.

Claims 15-17 depend from independent claim 14 and, as such, incorporate all of the features of claim 14. The Examiner provides no justification for the rejection of claims 15-17, which recite additional patentable subject matter. Therefore, for at least the reasons set forth above with respect to claim 14, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claims 15-17 be withdrawn.

Claims 20-23

Applicants' claim 20 recites:

20. A system for improved modeling of a chemical reaction comprising:
 - a modeling environment accepting user commands and input for constructing a model of a chemical reaction;
 - a simulation engine accepting as input the constructed model of the chemical reaction and generating as output an expected result; and
 - an analysis environment in communication with the simulation engine, *the analysis environment interfacing with data acquisition hardware, and using data gathered from an experiment to either correct the model of the chemical reaction or generate the model of the chemical reaction.*

Applicants respectfully urge that Sauro, Kurata, and Funhashi, alone or in any reasonable combination, do not disclose or suggest at least that *the analysis environment interfacing with data acquisition hardware, and using data gathered from an experiment to either correct the model of the chemical reaction or generate the model of the chemical reaction*, which is present in claim 20.

As discussed above with respect to claim 1, none of Sauro, Kurata, or Funhashi interfaces with *data acquisition hardware*, nor do the cited references use *data gathered from an experiment* to either correct the model or generate the model. Thus, Sauro, Kurata, and

Funhashi would not have any reason to disclose or suggest an *analysis environment* that interfaces with *data acquisition hardware* and uses *data gathered from an experiment to either correct the model of the chemical reaction or generate the model of the chemical reaction.*

Accordingly, for at least the reasons set forth above, Applicants respectfully urge that Sauro, Kurata, and Funhashi, alone or in any reasonable combination, do not disclose or suggest each and every feature of Applicants' claim 20. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 20 be withdrawn.

Claims 21-23 depend from independent claim 20 and, as such, incorporate all of the features of claim 20. Therefore, for at least the reasons set forth above with respect to claim 20, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claims 21-23 be withdrawn.

Claims 26-29

Applicants' claim 26 recites:

26. A computer-implemented method for integrated modeling, simulation and analysis of chemical reactions, the method comprising:

providing a graphical user interface for accepting user commands and data;

receiving, via the provided user interface, user commands and data;

constructing, using the received user commands and data, a model of a chemical reaction;

generating, using the constructed model of the chemical reaction, an expected result of the modeled chemical reaction; and

providing an indication that data gathered from an experiment and the generated expected result differ by an amount greater than a predetermined amount, if the amount the data gathered from the experiment differs from the generated expected result is greater than the predetermined amount.

Independent claim 26 generally corresponds to claim 8, except that claim 26 recites a "model of a chemical reaction" where claim 8 recites a "model of a biological system." Applicants respectfully urge that Sauro, Kurata, and Funhashi, alone or in any reasonable combination, do not disclose or suggest at least *providing an indication that data gathered from an experiment and the generated expected result differ by an amount greater than a predetermined amount, if the amount the data gathered from the experiment differs from the generated expected result is greater than the predetermined amount.*

predetermined amount, if the amount the data gathered from the experiment differs from the generated expected result is greater than the predetermined amount, which is present in claim 26.

As discussed above with respect to claim 8, none of Sauro, Kurata, or Funhashi disclose *data gathered from an experiment*, and so the cited references do not *provide an indication* when the experimental result differs from the expected result. Accordingly, for at least the reasons set forth above, Applicants respectfully urge that Sauro, Kurata, and Funhashi, alone or in any reasonable combination, do not disclose or suggest each and every feature of Applicants' claim 26. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 26 be withdrawn.

Claims 27-29 depend from independent claim 26 and, as such, incorporate all of the features of claim 26. Therefore, for at least the reasons set forth above with respect to claim 26. Applicants respectfully request that the above 35 U.S.C. §102(a) rejection of claims 27-29 be withdrawn.

Claims 32-35

Applicants' claim 32 is an "article of manufacture" claim corresponding to claim 26. Claim 32 includes: *computer-readable instructions for providing an indication that data gathered from an experiment and the generated expected result differ by an amount greater than a predetermined amount, if the amount the data gathered from the experiment differs from the generated expected result is greater than the predetermined amount.*

For at least the reasons set forth above with respect to claim 26, Applicants respectfully urge that Sauro, Kurata, and Funhashi, alone or in any reasonable combination, do not disclose or suggest each and every feature of Applicants' claim 32. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 32 be withdrawn.

Claims 33-35 depend from independent claim 32 and, as such, incorporate all of the features of claim 32. Therefore, for at least the reasons set forth above with respect to claim 32, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claims 32-35 be withdrawn.

Claims 37-39

Claims 37-39 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sauro in view of Kurata and Funhashi, and further in view of Shannon and Biospice. Applicants respectfully traverse the rejection.

Claim 37 depends from claim 1, and therefore includes each feature of claim 1. Claim 38 depends from claim 8, and therefore includes each feature of claim 8. Claim 39 depends from claim 14, and therefore includes each feature of claim 14. As noted above with respect to claims 1, 8, and 14, Sauro, Kurata, and Funhashi, alone or in any reasonable combination, do not disclose or suggest each and every feature of claims 1, 8, and 14. The addition of Shannon and Biospice fails to cure the factual deficiencies of Sauro, Kurata, and Funhashi.

Shannon describes Cytoscape, an application for “integrating biomolecular interaction networks with high-throughput expression data and other molecular states into a unified conceptual framework” (Shannon at Abstract). However, Shannon is entirely silent with respect to an *analysis environment interfacing with data acquisition hardware, and using data gathered from an experiment to either correct the model of the biological system or generate the model of the biological system*, as recited in claim 1, and *providing an indication that data gathered from an experiment and the generated dynamic behavior differ by an amount greater than a predetermined amount, if the amount the data gathered from the experiment differs from the generated dynamic behavior is greater than the predetermined amount*, as included in claims 8 and 14.

Biospice is generally directed to an application to develop “a physically-grounded, molecular understanding of bacterial stress response,” “an infrastructure suitable for rapid deduction of pathway dynamics,” and “a theoretical and computational infrastructure [to] store, relate and model the data at different levels of abstraction” (Biospice at “Goals”). BioSpice is silent with respect to an *analysis environment interfacing with data acquisition hardware, and using data gathered from an experiment to either correct the model of the biological system or generate the model of the biological system*, as recited in claim 1, and *providing an indication that data gathered from an experiment and the generated dynamic behavior differ by an amount greater than a predetermined amount, if the amount the data gathered from the*

experiment differs from the generated dynamic behavior is greater than the predetermined amount, as included in claims 8 and 14.

For at least the reasons set forth above, Applicants respectfully urge that Sauro, Kurata, Funhashi, Shannon, and Biospice, alone or in any reasonable combination, do not disclose or suggest each and every feature of Applicants' claims 37-39. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claims 37-39 be withdrawn.

CONCLUSION

In light of the above, Applicants respectfully urge that all of the pending claims are in condition for allowance. Should the Examiner feel that a teleconference would expedite the prosecution of this application, the Examiner is urged to contact the Applicants' attorney at (617) 227-7400.

Please charge any shortage or credit any overpayment of fees to our Deposit Account No. 12-0080, under Order No. MWS-111RCE2. In the event that a petition for an extension of time is required to be submitted herewith, and the requisite petition does not accompany this response, the undersigned hereby petitions under 37 C.F.R. §1.136(a) for an extension of time for as many months as are required to render this submission timely. Any fee due is authorized to be charged to the aforementioned Deposit Account.

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Respectfully submitted,

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